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Performances of Non-linear Smooth Transition Autoregressive and Linear Autoregressive Models in Forecasting the Ringgit-Yen Rate

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ABSTRAK

Kajian ini membandingkan prestasi peramalan di antara model ketaklinearan Autoregresi Berperalihan Licin (Smooth Transition Autoregressive atau STAR) dengan model linear siri masa iaitu model Autoregresi (Autoregressive atau AR) sebagai peramal kadar pertukaran Ringgit-Yen. Berdasarkan kepada prosedur penentuan kelinearan piawai, kami memperoleh bukti empirik bahawa penyelarasan Ringgit-Yen ke arah keseimbangan pariti kuasa beli (Purchasing Power Parity) adalah secara tidak linear. Dari segi prestasi peramalan, keputusan empirik menunjukkan bahawa model STAR dan AR mempunyai purata mutlak ralat ramalan (mean absolute forecast error atau MAFE), purata mutlak perarus ralat ramalan (mean absolute percentage forecast error atau MAPFE) dan purata punca kuasa dua ralat ramalan (mean square forecast error atau RMSFE) yang lebih kecil jika dibanding dengan model SRW. Keputusan yang diperoleh juga menunjukkan ramalan model STAR lebih baik jika dibandingkan dengan pesaing linearnya, iaitu model AR. Hasil kajian ini adalah konsisten dengan penyelidikan yang memberi penekanan kepentingan membenarkan pelarasan yang tidak linear bagi kadar pertukaran asing ke arah keseimbangan jangka panjang.

ABSTRACT

This study compares the performance of Smooth Transition Autoregressive (STAR) non-linear model and the conventional linear Autoregressive (AR) time series model in forecasting the Ringgit-Yen rate. Based on standard linearity test procedure, we find empirical evidence that the adjustment of the Ringgit-Yen rate towards its long-run Purchasing Power Parity equilibrium follows a non-linearity path. In terms of forecasting ability, results of this study suggest that both the STAR and AR models exceed or match the performance of SRW model based mean absolute forecast error (MAFE) mean absolute percentage forecast error (MAPFE) and mean square forecast error (RMSFE). The results also show that the STAR model outperforms the AR model, its linear competitor. Our finding is consistent with the emerging line of research that emphasised the importance of allowing non-linearity in the adjustment of exchange rate toward its long run equilibrium.

INTRODUCTION

In 1926, Yule first formally introduced the time series model in the form of autoregressive (AR) model, which assumes that the future values of a variable depend solely on its historical values. Since then, time series analysis has been viewed as a powerful forecasting tool. In the past two decades or so the theory of time series econometrics is progressing rapidly (Montogomery *et al.* 1990). As the methodology progresses, the issue of non-linearity was incorporated into the analysis of time series. Smooth Transition Autoregressive (STAR) model is one of the most recent models developed under this concept. The STAR model is a non-linear time series model that allows the variable